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COMPT 81-0850

CENTRAL INTELLIGENCE AGENCY
WASHINGTON, D.C. 20505

6 JUL 1981

MEMORANDUM FOR: Director, Intelligence Community Staff

SUBJECT : CIA Proposals for DCI FY 1983 Production Enhancement Initiatives (S)

1. We submit the attached 21 project proposals (Attachment B) for consideration as part of the DCI Enhancement Initiatives for for FY 1983. Although they have been placed in a priority order (Attachment A), each would provide a worthwhile enhancement to the CIA Program and is worthy of consideration. (S)

2. I understand that the Community-wide review process will start the week of 13 July, and I have asked [redacted] of my staff to assist you in that process. He may be contacted on [redacted]

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[redacted]

Maurice Lipton
Comptroller

Attachments:
A. Ranking Order of Enhancement Initiatives
B. 21 Project Proposal Packages

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CIA PROPOSALS FOR DCI FY 1983 PRODUCTION
ENHANCEMENT INITIATIVES
(in Rank Order)

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NFAC/PMES	Computer for Experimentation with Large Computation Intensive Applications	
NFAC/OPA	Exploiting Political and Social Data	
DDS&T/ORD	Large Scale Econometric Modeling System	
DDS&T/OSO	[redacted]	25X1
NFAC/OGSR	Nonfuel Mineral Supply-Demand Data	
DDS&T/ORD	Water/Rail Transportation Assessment	
NFAC/OSR/ OSWR	Center for the Study of Soviet Naval Tactical Warfare	
DDS&T/ORD	Advanced Cartographic Support System	
DDS&T/OSO	[redacted]	25X1
NFAC/OER	Computer Technology Research	
DDS&T/ORD	Cost Estimation Methodology for Non-Market Economies	
DDS&T/ORD	Digital Back-Issue FBIS Dailies	
NFAC/OGSR	Spatial Data Analysis Project	
NFAC/OER	Industrial Analysis Forum	
DDS&T/OSO	[redacted]	25X1
DDS&T/OSO	[redacted]	25X1

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NFAC/PMES	Systems Modelling Center	
DDS&T/ORD	Multidisciplinary Military Research	
DDS&T/ORD	Advanced Computer Techniques for the Production and Interpretation of Finished Intelligence Products	
DDS&T/ORD	Analytical Skills Enhancement Program	
DDS&T/ORD		25X1
	TOTAL	

30 June 1981

I. Project Title: Computer for Experimentation with Large Computation Intensive Applications

Submitting Agency: CIA

II. Costs:

[redacted] 25X1

III. Description of Project:

A. Statement of Need:

Several NFAC offices have requirements for experimentation with large computation intensive computer applications. Large computer models such as OGSR's CHALLENGE, some of OER's econometric models and some of OSWR's and OSR's systems/models require large amounts of mainframe computer processing time (some require hours). Consequently, the number of computer runs is limited to at most a few per work day and, in some cases, is limited to a single overnight run. Such delays reduce the overall amount of experimentation and exploitation that can be done with these models. They also constrain the ability to develop and subsequently run in a production mode. A solution to this problem, and for many computation intensive applications of this type, is a high speed digital processor with parallel processing of heterogeneous data. Such processors have been under development for several years and are just now beginning to enter the commercial marketplace. They have execution speeds of 10 to 160 million instructions per second, which compares to about five million instructions per second for ODP's largest IBM mainframe. Such speeds would reduce processing time by factors of up to 30 through execution of different instructions on multiple data streams simultaneously. This represents a significant advance in computer architecture. (U) 25X1

[redacted]

B. Who Will Accomplish?

ODP will install and operate the parallel processor. NFAC requirements for the processor will be coordinated through the NFAC ADP Control Officer. (U)

C. What is to be Installed?

A high speed digital processor with parallel processing of heterogeneous data elements is to be installed for experimentation with large computation intensive applications. (U)

D. Payoff

The payoff of such a processor to NFAC production offices will be substantial. For example:

- The OER linked econometric model of major western economies now requires so much mainframe computer resources that it currently gets only about a single run turn-around per work day.

- The OGSR CHALLENGE model is so large and so computation intensive that it currently gets only about a single run (or several late night runs) turn-around per work day.

These are but two examples of NFAC applications that will be considered for the parallel processor. The processor can provide for quicker and much more frequent turn-around of applications such as these. It will facilitate experimentation and allow for more exploitation of data due to timing considerations. Analysts will be able to, on one hand, be more speculative and be able to, on the other hand, do more fine tuning of applications when they are able to turn jobs such as these around in minutes rather than hours. In the case of the OER linked econometric model, the number of scenarios that can be analyzed is limited by the turn-around time. In the case of CHALLENGE, over 100 runs are required to fine tune a new version of the model. One run (or several late night runs) turn-around of the model per day is very restrictive. The more timely the runs, the quicker the feedback, and the more experimentation analysts can perform. (C)

E. Time Phasing

In the first year we will bring in the basic parallel processor system and begin experimentation with appropriate existing applications on the system. Lease vs. purchase considerations will be addressed as part of the system procurement cycle. In the second year we will expand the hardware to accommodate more experimentation with new applications. System capacity is in many regards modular. Additional capacity can be obtained by adding hardware. (U)

IV. Intelligence Community Applicability

Information on our experience with such a device, from a technical standpoint will be available to the Intelligence Community. We will also make available software and system information--barring proprietary limitations. Policy makers throughout government make use of output from Agency models such as OER's linked econometric model. In this regard the payoff from such a device will be applicable to the Intelligence Community. (U)

V. Intelligence Consumer Benefits

Increased experimentation with and usage of computation intensive applications will improve and broaden the scope of our intelligence product and consequently will benefit consumers. (U)

VI. Probability of Success

The probability of success is high. High speed parallel processors of the type described above should be available by FY 1983 from industry to provide incredibly fast processing times for many computation intensive computer applications. Such processors will provide a practical means for experimentation with large computation intensive applications. (U)

I. PROJECT TITLE: EXPLOITING POLITICAL AND SOCIAL DATA

Submitting Agency: CIA

II. COSTS:

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III. DESCRIPTION OF PROJECT

A. Statement of need:

Intelligence analysis is often constrained by limitations in readily available data. To the degree that information is difficult to identify and manipulate, it will not be incorporated in intelligence production. In practice, this has meant that a vast array of political and social information--on public opinion, social trends, and domestic confict--has remained largely untapped by NFAC analysts. When analysts assess political and social conditions, such as the potential for political instability, the effectiveness of foreign government policies, or support for its foreign policy, they, therefore, often rely on incomplete information.

This situation calls for the creation of a unique intelligence resource: a data archive of important political and social information and the means for analysts to easily use this information in their everyday work.

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To make these data readily accessible by analysts, an extensive interactive computer software system would need to be developed. The result would be an archive more extensive and timely than any that currently exists in either the public or private sector; one with sophisticated retrieval and analysis capabilities that would significantly enhance the depth and quality of NFAC analysis.

B. Current status:

The Intelligence Community is embarking upon an extensive effort to upgrade its capabilities to monitor socioeconomic trends in foreign countries through increased use of external data bases, such as those of the Bureau of the Census, and by more intensive analysis of these data. This is a vital effort. Rarely, however, can one infer political consequences from socioeconomic trends alone. To make this linkage, we need an in-house capability to store and retrieve not only socioeconomic information, but also information of a more political nature as well. For example, the historical relationship between inflation rate and a leader's popularity or the incidence of domestic protest could be quickly measured statistically and graphically. More complex models would lead to forecasts of stability within a country.

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OPA is collecting and computerizing political and social data that will facilitate interpretation of economic, demographic, and electoral trends by NFAC analysts. At present, the OPA Data Archive contains approximately 160 data files for use by Agency analysts

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The rapidly-increasing availability of information in computerized formats, the projected arrival of large numbers of computer terminals in NFAC offices, the development of analytic aids through ORD's Intelligence Production Laboratory project, and Agency acquisition of sophisticated computer graphics systems will soon make possible a thorough and systematic exploitation of political and social data. These new data and analysis tools will be of particular importance for the new political instability and terrorism analysts in NFAC.

C. What is required:

External research funds will be used to hire outside contractors to complete four basic tasks:

1) Development of a computer software system that will allow analysts to make queries regarding the availability of data on their country or issue and conduct simple statistical analyses. This would involve the capability to interface with computer packages -- including graphics support -- already available on the Agency's computer system or currently under development. The computer software development is vital if maximum utility is to be derived from these data. The system we envisage would permit the analyst to specify a country, region, or issue and receive at the terminal an inventory of available archive data by time period. The system would then query the analyst about his or her interests. At each point, the analyst would make choices, receive results, process data statistically or graphically, save files, and otherwise manipulate the data in an interactive way. Only by making the information readily available and easily usable will its full benefit be realized. It is estimated that development of this software will cost over the first two years.

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3) Transcription of socioeconomic data and election returns from published documents to computerized formats. We estimate 60 files will need to be transcribed at a cost of

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4) Coding of politically relevant events, such as acts of terrorism, insurgency and government reprisal within countries. OPA currently has such a file in the archive on 136 countries for the period 1948 to 1977. The contractor would bring the file up to date. Estimated cost of this work is 25X1

D. Implementation and timing:

We do not anticipate that these tasks will be implemented by the same contractor. OPA will have overall responsibility. The computer software development will be done in consultation with ODP. It is assumed that major portions of that work will have to be contracted out, since the task is likely to exceed ODP's available resources. External contractors are the most appropriate means for the massive data collection and preparation effort because of the need to develop an extensive set of historical files at the beginning. Once the historical baseline has been developed, the archive will be updated and maintained in-house, supplemented by a minor investment of office external analysis funds when required.

If this project is funded, the OPA will conduct an ADP requirements study during FY82 and locate, through competitive bidding, contractors able to perform the related tasks, so that there would be no delay in getting started in FY83.

IV. INTELLIGENCE COMMUNITY APPLICABILITY:

The archive would constitute a unique resource within the Intelligence Community that could be used by NFAC analysts via their terminals in either VM or Batch mode, but would also support requests for analysis from DIA and State. The computer-based retrieval and analysis capability will be developed with such flexibility that additional data bases could be added to the system in the future. OER's TRADAR data base, for example, will be linked to this system.

V. INTELLIGENCE CONSUMER BENEFITS:

The development of an archive of this sort responds directly to one of the basic issues involved in improving the quality of analysis--namely, insuring the systematic analysis of the most comprehensive data available. Consumers would benefit by getting products whose judgments are derived from the best available information.

VI. PROBABILITY OF SUCCESS:

While the data archive would be a unique resource, there are no known technical or administrative obstacles to its development. We anticipate that a significant amount of time would be needed to familiarize analysts with its capabilities and use.

I. PROJECT TITLE: Large Scale Econometric Modelling System

Submitting Agency: CIA

II. COSTS: [redacted] 25X1

III. DESCRIPTION OF PROJECT:

a. Statement of Need:

The volume of data and large number of variables which must be generated and processed for analysis of international economic situations is too great to be handled by existing Agency software. The current Community systems have severe limitations. For example, the Agency system is 1960 vintage and has many design defects which restrict the incorporation of advanced mathematical and economic techniques. The system architecture also seriously restricts the size of problems which can be generated and requires the user to resort to undesirably high levels of data aggregation. The Agency's current system (TROLL) has the capacity to run models with 2,000 equations and 4,000 variables. The high priority OER requirement which this project addresses is a system with the capacity to run models with 10,000 equations and 15,000 variables in the same CPU time and real elapsed time. OER's requirements can be met by a custom-developed system. (S)

b. What will be Developed

The system will essentially consist of two parts. One part will be designed for creating the framework of economic types of models. Its purpose will be to take econometric or mathematical statements, logical requests, and other such demands, and then generate an appropriate model. In addition, the first part of the system will also be able to perform data management tasks. The second part of the system will consist of a set of algorithms which will be designed to solve large scale econometric models on efficient computers such as array processors. Other systems capabilities such as storing the output from one algorithm for input in the use of another algorithm will also be available. (S)

[redacted] 25X1

The system will be designed in a modular fashion so that new algorithmic techniques can easily be incorporated and accessed (if required) to solve a new type of problem. As new generations of simulation and optimization software are developed, they will be implemented in the system to increase the efficiency and to provide even faster turnaround times. In conjunction with the system, the documentation will provide detailed definitions and sample problems, and general information about other applications of the techniques. (S)

c. Who will Accomplish

This project will be a joint effort by ORD/AMR, OER/DAC, and ODP/Applications. This project will require extensive commitments by both organizations. ORD will provide specialized manpower to manage the project. OER must provide manpower to document their experience with the current system and provide personnel to test the system as it is constructed. The following table represents the manpower requirements by ORD and OER for the duration of the project:

	FY 1983	FY 1984	FY 1985
ORD	2	2	2
OER	1	2	2

d. Time Phasing

This project will have a duration of three years. The direct research cost [redacted] The tasks which are required and their order of occurrence are as follows: 25X1

- o feasibility and system design study (FY 1983)
- o prototype software and documentation development (FY 1983-1984)
- o test, evaluation, and refinement (FY 1984-1985)
- o final system development (FY 1985)

FY 1985 costs will be borne by ORD and OER.

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IV. INTELLIGENCE COMMUNITY APPLICABILITY

The Agency is currently developing many econometric models to answer the questions from the White House, NSC, DOD, State, Treasury, and Commerce Departments. These models have been very useful, but the Agency has reached a level where a more sophisticated system is required to model and solve large-scale problems. (S)

V. INTELLIGENCE CONSUMER BENEFITS

This project will provide the intelligence community with a unique modelling system that has been designed to meet the Agency's requirements and specifications. Many of the software systems which the Agency has acquired have previously been developed for industry or academia. Although most of these systems do solve the Agency's immediate software needs, the analysts who must extensively use these systems have no input in the design and their experience in working on problems cannot be fully accommodated by such systems. The development of a new system would enable the analysts to incorporate their experience into the system design, and the system could be constructed to meet the long range goals of their managemet. (S)

VI. PROBABILITY OF SUCCESS

There is a high probability of success for this project. The recent advances in software and hardware have enabled business and researchers from academia to solve problems that are two or three orders of magnitude larger than they have previously solved. The technology and experience to undertake such a project currently exists, but it would require extensive participation on the part of the consumer, OER, and dedicated manpower by the managing office, ORD. (S)

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I. PROJECT TITLE: Nonfuel Mineral Supply-Demand Data Base

Submitting Agency: CIA

II. COSTS:

	FY83	FY84	FY85	FY86

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III. DESCRIPTION OF PROJECT:

a. Statement of need:

There is a persistent and justifiable Federal policy concern with the vulnerability of the United States and its allies to interruptions in the imports of nonfuel minerals that are critical to the maintenance of defense or essential civilian production or to the general strength of the Western economies. The United States, Western Europe, and Japan all import more than 90 percent of their requirements of such important minerals as manganese, cobalt, chromium, and bauxite; interruptions would severely affect steel production (manganese), stainless steel output (chromium), and the manufacture of jet engines (cobalt and chromium), among other industries. The United States is also dependent on imports of columbium, tantalum, and platinum, which are critical to such industries as jet engine manufacture, metal working, electronics, and petroleum refining.

The risks of supply disruption are magnified by the restricted availability of these minerals: chromium comes overwhelmingly from South Africa, platinum-group metals mainly from South Africa and the USSR, manganese from Gabon and South Africa, cobalt from Zaire and Zambia, and tantalum from southeast Asia. In short, these and other critical minerals are disproportionately imported from areas that are especially subject to instability or politically motivated supply interruption.

In response to this problem, the Agency has intermittently carried out ad hoc analyses of particular mineral supply or contingency situations, and its Resource Analysis Branch (ERAD/OGSR) has initiated a series of System Dynamics modeling efforts designed for systematic evaluation of the many influences, including political and commercial, that impinge or may impinge on the international flow of important nonfuel minerals. Such efforts, however, are hampered by the lack of comprehensive, systematically compiled and coordinated governmental and private information bearing on future nonfuel mineral consumption and supply. It is believed that the proposed effort would greatly enhance the potential for quicker, more penetrating, and more reliable evaluative efforts. While a substantial commitment of resources would be needed to establish the system, the maintenance cost should be relatively modest.

b. Who will accomplish:

The proposed data base would be maintained by Resource Analysis (RA) Branch staff after having been established as the result of both staff and contract efforts. It would rely largely on already ongoing effort, in the sense that it would combine and coordinate those relevant governmental and, possibly, commercial data bases already in existence or under development. Crude data and intelligence that is reported currently in a variety of open and classified sources would also be assimilated and coordinated.

c. What is to be developed:

The proposed data base would consist of a variety of separate data sets, both quantitative and narrative, on consumption, capacity, production, inventories, prices, and recycling, as well as on the relevant economic, political, psychological, geographic, institutional, and other determinants of those variables. Predictions made by other authorities would also be included—especially predictions or contingency scenarios that relate to the risk of future supply problems. These data sets would be maintained on disk and magnetic tape files accessible through the CIA VM system, which would be programmed to provide both machine readable output and printouts suitable for distribution or for inclusion in finished reports. Adjunctive use would also be made of the MAGAS system to provide a variety of graphic displays and cartographic arrays.

Under appropriate safeguards, the data sets would be made accessible in part to other government agencies, and efforts would be made to maximize, to the extent practicable, the automatic assimilation of data sets and inputs available from these other government agencies, as well as within the CIA itself. Following the practice of other government agencies, efforts would also be made to make the unclassified (security or business) portion of the data base available, through an appropriate agent (governmental or nongovernmental), to outside researchers and the general public.

The data sets would be established and maintained for each of the important commodity forms of those nonfuel minerals (tentatively, some 15-20) selected for their importance in the general economy and/or their critical defense applications. Particular priority would be given to those minerals characterized by the greatest apparent risk of potential supply problems. Part of the initial project for establishing the data base would be the review of selections and selection processes already used by other Federal agencies. To the extent possible, advanced forms of a particular mineral would be linked to the specific sources of contributory inputs and cruder forms would be linked to the specific processors which consume them.

Information on relevant determinants would be kept in separate data sets, code-linked to the particular minerals and commodity forms to which they were relevant, and there would be similar,

reverse linking of the particular mineral commodities to the determinants. These determinants would include not only macroeconomic, financial, and end-use consumption information, but institutional and political factors affecting production or consumption in particular places, including specific business interrelationships. Care would be taken to include political and business-relationship factors that would be likely to affect the volume and direction of supply in a stringency or contingency situation.

The data sets would consist not only of crude statistical and narrative inputs, but of such analytical summations and manipulations of the data as were determined to be useful on a routine basis. Reports would be examined for apparent original source and duplicate reports eliminated (with preference being given to the retention of the least highly classified), except as duplication (or partial duplication) seemed to be useful for purposes of corroboration or clarification; procedures would also allow for the routine replacement of original reports in their entirety, where warranted, by analytical summaries, conversions, or abstracts.

Apparently contradictory statistical data sets would be maintained, as seemed useful, with cross-references to explanations of the reasons for apparent or actual discrepancies; this would be particularly in order for statistical data sets in common use, including preliminary versions of statistics subjected to later adjustment. Annotations would include reasons for preferring particular statistical sets for particular applications. Routinely compiled composite, synthesized, or converted data sets deemed to have useful analytical application would likewise be included. All of the data sets used in the System Dynamics modeling would be included, with the annotations in the computer file serving as the necessary documentation.

Access to, and maintenance of, these files would require additions to the present complement of computer terminals. The corresponding offset would be a material reduction in the need for individual file-keeping. The proposed data base would entail some small overlap with the computerized document service of the Office of Central Reference, but would differ from the latter in its organization and in its inclusion of processed rather than crude intelligence; the OCR data base would be a key source for initial file establishment. There would also be small overlaps with the USGS Computerized Resource Information Bank (CRIB), the Bureau of Mines Minerals Availability System (MAS), and other Bureau of Mines computerized files (such as one on aluminum processing facilities and a developing Automated Mineral Information System (AMIS); to the extent feasible without sacrifice of analytical capabilities, summary or synthesized output from these or other relevant files would be utilized in lieu of raw records.

d. Time phasing:

Since the proposed data base consists of a number of discrete segments and sources, it can be phased in over a period of time and yet be useful as soon as the first segment is in place and accessible. Nevertheless, it is assumed that the bulk of the work of establishing the data base can be accomplished, under one or more outside contracts, during the first year of the program, with practical application and "debugging" commencing late that same year.

Several concurrent operations would be initiated within the first few months of the first year, including, tentatively: design and award of contracts for reconnoitering, appraising, and, if appropriate, designing procedures for the incorporation of one or more governmental data bases; in-house investigation of the optimal means for incorporating material from the OCR and other intelligence community files; and staff exploration with the Office of Data Processing (ODP) of the optimal means for assimilating inputs into the proposed file, maintaining the file, providing both for restricted and unrestricted access, and linking the file with the System Dynamics models and other computerized operations.

The second half of the first year would see the initiation of staff work or contract design and award for follow-up with regard to gaps in the system or, if necessary, improvements in system design. In particular, the initial assessment of privately maintained data bases may reveal a void needing to be filled by original collection and coordination of published reports bearing, particularly, on announced plans and projects for establishment, expansion, or contraction of mineral extraction and processing capacity. Work on this or other supplementary contracts, if required, would be carried on mostly in the first half of the project's second year. The third year of the project would find the data bank in full current operation, though still on a "shakedown" basis. The amount budgeted for the fourth year is the estimated level of continuing operating expense for the mature system, subject only to later inflationary escalation.

In the detailed scheduling, priority would be given to those minerals and those elements of the system that were most relevant to providing assessments of situations with apparently greatest risk and most serious consequences of a supply contingency.

IV. INTELLIGENCE COMMUNITY APPLICABILITY:

The project might pioneer some methods of data banking and access —particularly with regard to varying degrees of access by varying categories of users — but this would be only an incidental and possibly not too visible by-product. It may also lead to the development of new techniques for the screening and integration of partially or wholly inconsistent reports on the same subject. In the development of the project, previous experience of this sort would be reviewed, to the

extent practicable, and information on any apparently useful new experience gained would be disseminated to the intelligence community.

V. INTELLIGENCE CONSUMER BENEFITS:

The principal benefit to intelligence consumers would be a considerably enhanced capability both for foreseeing the emergence of potential mineral supply problems and for evaluating the implications of contingency, policy, and other scenarios affecting mineral supply. These benefits would accrue both from direct evaluation of the entries in the data base and -- especially for longer term problems -- use of the data base in the System Dynamics models. Of a comparable order of benefit would be the vastly increased productivity of each hour of RA analyst time -- sufficient, it is believed, to provide a substantial net benefit over and above the costs of establishing and maintaining the data bank. It is believed, furthermore, that as familiarity with the data base spread to other parts of the intelligence community, significant cost and time savings would be effected for other analysts as well.

VI. PROBABILITY OF SUCCESS:

There has by now been a sufficiently large body of successful experience with large data banks — both numerical and narrative and particularly within the CIA -- that the probability of success for the one here proposed is very high. Furthermore, the proposed data base would be a success in terms of its productivity, quality, and cost aspects even if particular parts of it failed to be achieved. Although some risk exists with regard to the costs and degree of effectiveness with which the objectives -- including both original establishment and later upkeep -- are accomplished, it is very unlikely that the outcome would be such as to negate in its entirety the potentially large excess of net benefit.

I. PROJECT TITLE: Water/Rail Transportation Assessment

Submitting Agency: CIA

II. COSTS: [redacted] 25X1

III. DESCRIPTION OF PROJECT:

a. Statement of Need:

The flow of economic goods and military supplies is highly dependent upon a country's water and rail transportation infrastructure. For example, the main mode of east-west transfer and support of Sino-Soviet forces is by rail. The ability to maintain a tactical account of material flow is frustrated by the large amount of all-source data that must be assimilated and analyzed. Current analytical capabilities are restricted by a lack of large-scale, high speed modelling techniques and a data base management system for network models. The current Agency modeling systems only have the capacity to efficiently model transportation systems with a few hundred lines. Models of this size are excellent for classroom exercises, but they do not exploit the full economic and physical integrations which are available and necessary to understand large, complex network systems. Recent advances in software have provided the ability to efficiently solve network problems that are three and four orders of magnitude larger than those solved by classical procedures and do it in near-realtime. (S)

b. Who will Accomplish:

This project will be a joint undertaking between ORD (AMR) and NFAC (OER, OSR, OGSR, and OIA). It will [redacted] 25X1

*FY85 costs will be borne by ORD and customer offices.

[redacted] 25X1

c. What will be Developed

A data base management system will be adopted to collate and format the diverse sources of information into the desired structures. A transportation model (simulator) will be analyzed to provide an assessment methodology for a water and rail system for a selected region. An interactive information management system will be employed to allow the analyst a direct interface with the model and the data base. [redacted] 25X1 25X1

d. Time Phasing:

This will be a three year program. The first year will involve the development of a data base on Soviet rail and water systems, movements, and port facilities and, the procurement and adoption of a data management system and network models. In the second year, systems documentation will be prepared and qualified personnel will run pilot operations. The third year will focus on entering the analytical model to handle assessments for other selected transportation networks. (S)

IV. INTELLIGENCE COMMUNITY APPLICABILITY:

This assessment procedure will be employed not only by NFAC but also by DOE and DIA. The Community will share a common data base and evaluation criteria. The analysts will be able to routinely employ imagery and automatic mapping procedures to generate the transportation networks and monitor key targets such as depots. Information processing routines will automatically calculate distances, potential flow capabilities, and duration of movement. This methodology can provide significant data and criteria in establishing collection requirements. (S)

V. INTELLIGENCE CONSUMER BENEFITS:

The consumer of intelligence information will be assured that the complex issues such as Soviet grain transshipment, east-west military mobility, and economic infrastructure limitations can be routinely examined and analyzed with a formal methodology by the intelligence community. In addition, the collection requirements employing expensive and high demand collectors will be coordinated and efficiently employed. (S)

VI. PROBABILITY OF SUCCESS:

This project, though complex in nature, is based on proven industrial modelling techniques. The multidisciplinary operations research approach [redacted] will insure a highly reliable end product. Combining both of these elements should provide confidence in successfully meeting the project objectives. (S)

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I. PROJECT TITLE: Center for the Study of Soviet Naval Tactical Warfare

II. COSTS: [redacted] 25X1

III. DESCRIPTION OF PROJECT

A. Statement of Need

There is currently much debate over the capability of the US Navy to carry out its missions of sea control and projections of power ashore. As US dependence on Mid-East oil has increased, so have the concerns about the capability of the US to protect vital shipping lanes and, if necessary, to transport troops and equipments to remote regions and then provide extended logistical support. Accurate assessments of Soviet naval capabilities and intentions are vital as decisions about the size, capabilities, and composition of our navy are being made. These assessments require a thorough understanding of Soviet naval doctrine and Soviet perceptions of US naval capabilities. Additionally it requires an understanding of Soviet weapon systems, ships, submarines, and the means of integrating these elements into effective naval forces. It also requires an understanding of Soviet naval support entities that range from satellites for targeting naval weapons to supply ships for allowing extended naval operations. Finally it requires a broad understanding of Soviet and US naval programs in order to evaluate their comparative strengths and weaknesses.

Currently, many efforts are underway within the Intelligence Community to evaluate technical elements of the Soviet Navy. However, these efforts are largely fragmented with little coordination between agencies and deal with a limited aspect of the overall naval problem. The resultant products are not always effectively integrated into a comprehensive perspective of Soviet naval capabilities and intentions. The mechanism does not exist to focus the currently ongoing technical analysis into a comprehensive Community view. The NIE process does this type of comprehensive integration for the Community at the policy level but obviously is not intended to provide an acceptable outlet for appropriate consumers at the technical analysis level. The results are that gaps in our understanding are not readily identified and recommendations regarding data collections are often lacking. A single center for the study of Soviet tactical weapons could complement each agency's program and integrate the analytical efforts already underway, identify gaps in analysis and collection, initiate studies to fill the analytical gaps, recommend changes to fill the collection gaps, and, in general, provide a comprehensive product in Soviet naval tactical weapons. In conjunction with the US Navy many issues regarding future US programs could then be addressed in a more knowledgeable manner.

B. Who Will Participate

The proposed Center would be administered by an Interagency Control Committee consisting of a member and alternate from CIA, NSA, NISC, DIA, and FTD. Because of CIA's centralized intelligence function, they will provide the chairmanship for the Committee. All members and alternates shall be at a first or second tier management level within their respective organizations. The Interagency Control Committee will provide for interagency awareness of and informal coordination of all community naval analytical efforts but will provide no censorship or control authority over these efforts. Recommendations, however, will be made to the sponsoring agencies as appropriate. The Committee will also identify important issues that need to be addressed by the Community, initiate contractor support to bridge important gaps, and provide a mechanism for the comprehensive integration of the technical analysis output of the Community into important studies of a broader scope. It is anticipated that a willingness will be present on the part of each agency to direct some level of effort toward meeting Center goals.

C. What is to be done

The Center will ultimately give a comprehensive appraisal based on an interdisciplinary approach, regarding the Soviet capabilities and assets available to initiate and sustain tactical warfare and Soviet doctrine regarding such warfare. In documenting this appraisal, inputs related to the following more specific areas will be sought from Community elements:

- o Role of the Soviet navy as a tool to effect political goals and project economic/military power;
- o Soviet naval tactical doctrine
- o Naval command, control, and communications structures;
- o Methodology, procedures, and equipments used for battle management and pre-battle planning;
- o Soviet perception of US naval tactical warfare capabilities, assets, doctrine, etc.;
- o Capability of Soviets to acquire relevant intelligence;
- o Targeting against naval forces to include targeting assets, accuracies, timeliness, etc.;
- o Definition and evaluation of the ECM environment and assets available;
- o Naval systems capabilities, vulnerabilities, availability, numbers, deployment, technical parameters;
- o Human factors;
- o Equipment factors;

- o Factors in deciding whether to initiate nuclear tactical warfare or conventional tactical warfare;
- o Specific evaluation of important scenarios;
- o Changes in US collection of intelligence.

D. Time Phasing

In the first year we will establish the Interagency Control Committee and develop the methodology to comprehensively examine Soviets capabilities. We will identify critical elements in our understanding of Soviet naval capabilities and initiate analytical efforts for those elements for which adequate analysis does not already exist. We will attempt to integrate the massive intelligence effort already being expended on the Soviet Navy and determine if collection efforts can be initiated or redirected to answer questions that have previously been unanswerable. We will review Soviet reactions to current US naval programs and estimate Soviet reaction to future US programs.

Extensive analyses of critical Soviet weapons, radars, ships, submarines, satellites, and battle management assets will occupy the next two years. Additionally, we will have to acquire a thorough understanding of US naval programs and capabilities in order to view Soviet programs and capabilities in their proper context. The final year of the study will be spent evaluating the effectiveness of an integrated Soviet naval force in achieving Soviet naval goals. Test cases in evaluating the validity of our conclusion will involve specific scenarios relating to vital US needs. For example, we will assess the capability of the Soviet Navy to impair the US Navy's capability to protect shipping lanes from the Mid-East oilfields in the face of determined Soviet opposition. Additionally intelligence requirements that cannot be fulfilled with current or planned collectors will be identified.

IV. Intelligence Community Applicability

The comprehensive methodology used by the Center could serve as a model for other topical categories within the US Intelligence Community. Additionally, the results of the analysis will affect analytical requirements and collection efforts at NSA, DIA, NISC, and CIA. Establishment of this Center will allow us to optimize collection of Soviet naval intelligence with current capabilities and define specific requirements for future collection.

Intelligence Consumer Benefits

If successful, this effort should greatly aid the US Navy in assessing the Soviet capability and assets available to conduct tactical warfare and in planning for future resources. Additionally it will aid a wide variety of US policy makers by better defining the

strengths, weaknesses, and limitations of the Soviet Navy in thwarting US global plans. This effort will also serve as a valuable input into DoD officials and Congress in allocating future US military funds.

Probability of Success

This effort, if well managed and with selfless cooperation from Community agencies, has a high probability of limited success and could well prove to be very successful if cooperation exists at a high level. The greatest uncertainties concern the complexities of the problems, the sufficiency of the data, and the degree of interdisciplinary cooperation.

26 MAY 1981

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I. PROJECT TITLE: Advanced Cartographic Support System

Submitting Agency: CIA

II. FUNDS: [redacted] 25X1

III. DESCRIPTION OF PROJECT:

a. Statement of need:

Many intelligence production activities use geographic information as an intelligence source. These analyses are supported in part by cartographic data bases maintained by OGSR; however, these data base systems are designed to store cartographic features in point or linear form. These data structures and formats were historically designed around the limitations of digitizing and plotting systems and were tailored for traditional use in the preparation of maps and charts.

A number of functions of interest to analysts are not supported. In particular, partially overlapping areas--e.g., the not structly hierarchical lapping areas--e.g., the not strictly hierarchical nature of neighborhood, ward, school district, SMSA, borough, city, county, state, industrial region--cannot be easily manipulated. A similar problem arises for point targets, area targets, cultural features like rail/water routes, growing regions, and political boundaries. Similarly, relationships of cultural and geographic features--e.g., feed roads and rails, water tributaries, point targets as part of a larger target complex--are inadequately treated today.

The geographic information systems must be enhanced and expanded to support the future needs of production analysts, imagery analysts, cartographers, geographers, and publication artists. Therefore, several functions are needed to support and supplement ongoing CIA programs (e.g., NFAC's Analyst Productivity Theme, OGSR's Graphics Automation Upgrade, NPIC's NDS).

One need is for a cartographic data base management system. Present data bases contain point and vector data; that is, they can support the drawing

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of outline maps with labels, cities, etc. These data bases do not support certain basic analytical problems requiring a computer system which contains geographic information, e.g., "is this point in France," "is this river a tributary of the Seine." The present data bases must be upgraded to include such geographical information and research must be done to identify what sorts of information are needed by intelligence analysts, how such information should be stored in a data base, and how our existing data bases can be efficiently transformed and enhanced.

A second need is the ability to use various analytical data bases in conjunction with the geographic data base and to be able to merge analytical data bases from several sources. The system must be able to maintain geographical relationships such that they can be accessed across a variety of applications. The system should be designed, insofar as possible, to be compatible with the needs and products of other systems (e.g., NPIC's NDS, CAMS).

Additional research is needed on related themes, including:

- o Communication of geographic information among different systems and different devices (e.g., graphics shops, television centers).
- o Specialized mapping techniques for showing information (e.g., cartograms--distortions of geography to portray data, i.e., showing the size of a country according to its population rather than its area.)
- o Raster and vector data merger.

b. Who Will Accomplish:

The proposed work would be done by existing ORD staff personnel with external contractor assistance. ORD would work closely with OGSR graphic and cartographic staff members. ORD would also be responsible for coordinating with other groups in the Agency, especially NFAC and NPIC, on applying the research results to real-world analytical problems and systems.

c. What is to be developed:

We will develop the following products:

- Survey of external state-of-the-art geographic data base systems (e.g., Harvard's mapping software, DMA data bases, JPL's VICAR system) and appropriate graphics and cartographic technologies. (This is a relatively minor effort since ORD and OGSR are already monitoring these fields.)
- Set of analytical requirements for support.
- Integration of appropriate external software with existing Agency systems (e.g., WORLD DATA BANK, CAM, MAGAS, TACK).
- Research and development efforts for those requirements for which no existing methodologies are sufficient; these efforts will build on ORD's existing research programs in information handling, artificial intelligence, computer graphics, and interactive systems, as well as ORD's knowledge of other research in government, industry, and academia. Likely areas include:
  - Automated digitization and map building.
  - Specialized mapping techniques.
  - Query systems for analysts using multiple-source data with geographic data bases.
  - Formatting techniques, especially for communicating information among different offices and different media.

d. Time Phasing:

Because this project builds upon and supports other on-going ORD and Agency projects, most of the groundwork and preliminary analysis will be prepared in FY-82. The first year of the DCI Enhancement will

provide for system integration and the first research projects. The second year's funding will be devoted to research and development.

IV. INTELLIGENCE COMMUNITY APPLICABILITY

The project will produce an enhanced World Data Bank, which is a major resource for the Community at large. Insofar as it supports COMIREX and NPIC, it should enhance the Community's capability as well. ORD and OGSR are already working together with NSA and other parts of the Community on graphics and cartography and we assume that all research performed under this effort will be shared in a like manner.

V. INTELLIGENCE CONSUMER BENEFITS:

The project will result in increased capability for analysts, cartographers, and graphic designers. This, in turn, should provide improved analysis and presentation of the analytical product.

VI. PROBABILITY OF SUCCESS:

The probability is high for producing a system which will significantly improve geographic/cartography data handling and analysis. It is likely that it will improve the Agency's ability to handle more data with no increase in staffing.

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I. PROJECT TITLE: Computer Technology Research

Originator: CIA/OER/DAC

II. COSTS:

25X1

III. DESCRIPTION OF PROJECT:

a. Statement of need:

We in the Agency are now spending millions of dollars per year on computers, partly to increase the productivity of NFAC analysts. Our success will depend on how we spend the money.

There is a big difference between (1) computer systems for document storage and retrieval, and (2) systems for analytic calculations. Project SAFE will provide access to documents, but SAFE itself will offer few if any computer capabilities to pull numbers from different files, and then do calculations based on the numbers. For that purpose, different computer software is necessary.

Analytic computer software is very important in NFAC, and it will continue to be even after SAFE has grown to its full size. In particular, analytic systems are essential for various intelligence assessments of energy markets, arms trade, Soviet economic prospects, and many other subjects.

Analytic computer systems differ tremendously in one respect. Using one system, an analyst with a week of training and an hour of effort can program certain calculations. The same calculations, done on a different system, may take months of effort by a programmer with years of training. This difference among systems is sometimes called user friendliness, and it is a critical determinant of how productive our machines and people are, as a team.

Determining the best analytic software takes time, talent, and money, just as in many other fields of research. Hundreds of new systems are put on the market each year. To choose intelligently, we have to take the time to find out what the new systems really offer, how expensive they are in total, and how well our analysts can use them.

It is difficult to tell how well a new system will work, without ever allowing analysts to test the system. Therefore, it makes sense to begin and continue a program in which our computer specialists seek new analytic software, and install the most promising systems for analysts to test. OER's newest system of information storage and retrieval--namely the RAMIS package--is now over ten years old. Something better has almost surely been developed in the last decade.

b. Initial phases:

The funds requested for FY83 are to cover the testing of successors to OER's present system of data storage and retrieval. OER, ORD, and ODP would develop criteria for testing the new systems. These criteria would be applied by an external contractor to systems suggested by the three offices, along with other systems suggested by the contractor. At the end of FY83, a decision would probably be made to purchase a new package, for approximately [redacted] Thereafter, the research on new software continues at an annual rate of [redacted] while [redacted] per year is allocated for purchasing new systems based on the research. 25X1 25X1

IV. CONSUMER BENEFITS:

This project would develop more sophisticated computer software, so that analysts could create their own files of machine-readable data, and access these files. OER would benefit from this effort in the areas of international arms trade, shipping, and finance, and in narrower areas of research on specific industries and commodities.

V. COMMUNITY BENEFITS:

New systems for accessing certain databases would naturally be available to other intelligence agencies, if the systems are not proprietary. In particular, the Defense Intelligence Agency has already requested a cooperative effort on our database of international arms sales, along with the National Security Agency.

VI. PROBABILITY OF SUCCESS:

It is possible that we are now using the very best computer technology for our work, and that without an additional effort we will somehow keep pace with developments in the field, so that additional research would yield no payoff. On the other hand, for an amount not to exceed 2 percent of our current annual expenditures on computers for NFAC, a new program of software research might easily double the productivity of our computer system for intelligence analysis.

26 MAY 1981

I. PROJECT TITLE: Cost Estimation Methodology for Non-Market Economies (C)

Submitting Agency: CIA

II. COSTS: [redacted] 25X1

III. DESCRIPTION OF PROJECT:

a. Statement of Need:

At present, NFAC analysts have no meaningful way to measure the value or production cost of a commodity in a non-market economy. Prices in local currencies are available for many items, but they are set by government agencies and do not reflect the relative scarcity of goods or the value of inputs to their production. (C)

Analysis of the Soviet strategic metal industries, for example, a high priority economic intelligence target, has been vitiated by the lack of a cost estimation methodology. NFAC analysts have no reliable way to measure what it costs the Soviet Union to produce uranium, chromium, cobalt and other strategic metals. As a result, when a cost estimate is needed, for example, to evaluate uranium resources, U.S. production costs are assumed to obtain. (Resources are defined as the amount of a mineral that can be produced at a given price level). But this assumption is tenuous at best and OER analysts wish there was a valid and accurate way to estimate Soviet strategic metals production costs. Such estimates would not only have great value in themselves but would enhance CIA abilities to 1) measure trends in Soviet strategic metals production costs over time; 2) estimate production cost differentials among various parts of the Soviet Union; 3) predict future levels of Soviet strategic metals production, imports, or exports, and 4) anticipate, analyze, and interpret developments in Soviet strategic metals industries. (S)

This project will develop a quantitative indicator of production costs for use in a non-market economy and demonstrate its use by applying it to the strategic metals industry in the Soviet Union. (S)

*FY85 costs will be borne by ORD. [redacted] 25X1

b. Who will Accomplish:

The cost estimation methodology should be developed by an external contracting team composed of economists and engineer-economists who have expertise in non-market economies. The cost estimation methodology should be applied to the Soviet strategic metals industry by external contractors who are engineer-economists familiar with the Soviet Union. The work should be carried out with inputs from OER analysts who will be using the finished products. (C)

c. What is to be Developed:

The project will yield three different kinds of products:

1. A multidimensional indicator of costs for use in studying non-market economies.

Prices in the Soviet Union are set by government agencies, not the market, and, therefore, do not reflect the relative demand for, scarcity, or production costs of the commodities to which they apply. A price expressed in roubles or dollar equivalents tells an analyst very little about the cost or value of an item in the USSR. The first goal of this project will be to develop a multi-dimensional indicator of the cost of producing metals that takes into account such inputs as energy, skilled and unskilled labor, raw materials, technology, infrastructure, etc. This indicator will enable analysts to understand production costs within the perspective of the USSR's national and regional economies and to understand the implications of cost differentials over time, with various technologies, and in various parts of the country. (S)

2. A methodology for estimating production costs in a strategic metal industry.

[redacted] would be used to analyze the technology employed at individual strategic metals plants. Information about that technology as used in the free world, modified by knowledge of Soviet industrial practices and the

25X1

design and operation of Soviet iron mines and steel plants (for which there is abundant information) would be used to generate production cost estimates expressed in terms of the project's multidimensional cost indicator. Additional cost and data verification can be obtained from émigré accountants, economic planners, economists, and engineers. The methodology can be tested by applying it to free world countries such as Canada or Sweden, which are geographically or climatically similar to the USSR. (S)

3. Estimates of the cost of producing uranium, chromium, nickel, cobalt, etc. in the Soviet Union.

The costs of producing uranium should be estimated first because of its value to [redacted] which is developing a uranium resource estimation methodology. (S) 25X1 25X1

d. Time Phasing

During the first year the cost indicator, the methodology for estimating production costs in a metals industry, and an estimate of the Soviet cost of producing uranium will be produced. Estimates of the costs of producing other strategic metals, e.g. chromium, nickel, cobalt, and manganese, would be generated during the second and third years. During years two and three the contractor will give NFAC analysts short courses in the development and application of the strategic metals cost estimation methodology. Tours of metals production facilities will be included in this training. (S)

The first year's products will be published in a methodological report. Economic and technical analyses of each strategic metal industry, including production cost estimates, will appear as separate reports. (C)

IV. INTELLIGENCE COMMUNITY APPLICABILITY

The project's "multidimensional indicator of cost" will be a highly useful tool for analysts of the Soviet economy. The strategic metals production cost methodology and the cost estimates will be of direct benefit to intelligence analysts following those industries and industries in which strategic metals are used. (S)

All the products of this project can be adapted for use in studying other non-market economies such as those of China, Cuba, and the Eastern European nations. The project, too, will indirectly enhance analysis of world production and trade in strategic metals. (S)

V. INTELLIGENCE CONSUMER BENEFITS:

The products of the Soviet Strategic metals production cost estimates methodology project will greatly enhance the quality of intelligence available to policy makers concerned about Soviet military and industrial strength, the Soviet Union's role in world trade, and U.S. dependence on imported strategic metals. (C)

VI. PROBABILITY OF SUCCESS

The probability of developing a methodology to estimate strategic metals production costs in the USSR is fairly high. It will, however, depend on finding a contractor familiar with the Soviet economy and on inputs -- already volunteered -- from OER analysts with much experience with Soviet metals industries. (C)

I. PROJECT TITLE: Digital Back-Issue FBIS Dailies

Submitting Agency: CIA

II. FUNDS:

25X1

III. DESCRIPTION OF PROJECT

a. Statement of need:

In automating the production of FBIS Daily Reports, Project MIDAS will, as a by-product, be able to provide a digital version. This is certain to appeal to customers who wish to use new computer tools for manipulating, retrieving, indexing and cross-referencing, and disseminating text. As with many such services, however, the start-up could be slow: software for use with a digital daily report will not have been refined, analyst experience will be lacking, and more importantly a critical mass of back issues will take time to accrue.

This proposal recognizes the need to provide, at the outset, a certain historical base of on-line daily reports, to specify the formats so that software can be designed now to mate to that base, and to design certain of that software now.

b. Who Will Accomplish:

The Foreign Broadcast Information Service (FBIS), and CIA's Office of Research and Development (ORD)

c. What is to be developed

Within the scope of the proposed effort, two year's of FBIS Daily Reports will be digitized, indexed, and cross-referenced. Distribution formats will be standardized, and software interface specifications will be published. Copies of the database so constructed will be made available to Community members for test and evaluation. Experiments at CIA will be conducted by ORD within the scope of this effort.

d. Time Phasing:

Excepting the early front-end design work, the effort is spread equally across the two years. Its fruition should phase nicely into FBIS Project MIDAS plans.

IV. INTELLIGENCE COMMUNITY APPLICABILITY:

The Foreign Broadcast Information Service is run by CIA as a service of common concern for the US Government. The entire intelligence

community represents an important sector of the subscriber base. Many members of this community have the processing power and the unique needs to take advantage of such an available database.

V. INTELLIGENCE CONSUMER BENEFITS:

FBIS reports are the second largest US Government publication. All intelligence consumers will benefit from the timeliness, personalizable indexing and cross-referencing, and timeliness. Consumers who are their own analysts will appreciate it all the more.

VI. PROBABILITY OF SUCCESS:

Building, as this project does, upon preliminary experiments using back issues of the FBIS Daily Reports and commercial OCR technology, the digitizing of the database has a high probability of success, although the cost projections recognize that some human intervention will be necessary to clear up certain ambiguities. As the database description and management methodologies have matured, and as many organizations turn their attention to large collections of textual data, the specifications are also quite likely to be successful the first time. No technological breakthroughs are required.

In the larger sense of being analytically useful, the effort also has a high probability of success.

I: PROJECT TITLE: Spatial Data Analysis Project

Submitting Agency: CIA

II: COSTS:

25X1

III: DESCRIPTION OF PROJECT:

a. Statement of need:

The quality of intelligence products depends as much on the quality of the raw data used in analysis and the inferences that can be derived through comprehensive modeling of that data as it does on the expertise of the intelligence production analyst working the problem. In recent years the volume of data available to analysts has increased extraordinarily; the advent of electronic mail is an indication of the magnitude of this growth and the concomitant need to efficiently sift through the data, organize it, and present it in a manner most effective for meaningful analysis. At the same time, analytical efforts are necessarily growing in complexity with the recognition that many of the problems being addressed are affected by a growing number of variables that both interact with each other and have an impact on the end result. For exceptionally complex problems, the analyst must use sophisticated simulation models to determine likely outcomes and alternatives. This is particularly true where large geographic areas are a dimension of the problem, as is the case in a variety of natural resource analysis efforts underway in CIA.

In order to address these types of problems adequately, it is necessary to develop new and innovative ADP procedures and techniques, new software modeling approaches, and better interactive graphics support for the modeling efforts. Faster, larger-capacity computational capabilities are needed. Experience in OGSR has shown that natural-resource modeling efforts, which typically involve solution of complex, multi-dimensional estimative equations, tend to demand exceptional amounts of dedicated computer memory, use excessive amounts of processing time, and require special types of peripheral data processing equipment. Furthermore, these types of models are most effective when the analyst has quick and repeated access to them. The typical process involves frequent readjustment of variables until model output matches available data, followed by simulations of possible future alternatives and tests of modeling assumptions. Special-purpose data processing equipment is necessary to make this process most cost-effective. In order to develop the requisite modeling capability it is necessary to significantly upgrade OGSR's MAGAS (Meteorological Agronomical Geographical Analysis System)--which presently provides primarily interactive graphics analysis and cannot handle large models--through procurement of appropriate complementary processing equipment; in our experience existing OGSR and Agency computers cannot address these types of modeling needs

in the Ames Building location with the necessary efficiency. The models OGSR would like to use to help its analysts work with the large volumes of available data (many of these models have already been acquired by CIA) will then be adapted to the processing equipment through specialized programming assistance. This combined hardware/software package will give OGSR analysts a powerful new capability to conduct quick sequential runs of their petroleum analysis models, water resources models and other large numerical simulation models that are currently very costly in their use of both staff and contractor resources because of the amount of computer memory they require and slow turnaround times.

Both the equipment and programming needs can be met quite readily. In industry, special-purpose computing systems employing array processors tied to minicomputers (which are enormously efficient in solving the types of "number-crunching" partial differential equations resource models typically use) are being developed for just such applications. The added computing capability that will make these array processors compatible with MAGAS and the unique graphics capabilities it provides for this type of work is available in industry, and most of the models OGSR is interested in using have been (or can readily be) adapted with minimal programming. It is therefore in the interest of significantly increasing analyst efficiency and analytical capabilities that we propose the Spatial Data Analysis Project, through which these OGSR needs will be defined and coordinated, a system capable of meeting them will be developed, and the desired models will be installed on the system.

b. The Spatial Data Analysis Project

In the first phase of the Spatial Data Analysis Project anticipated OGSR modeling needs during the early 1980's will be identified and the system capabilities necessary for satisfying them will be defined. The OGSR experience with MAGAS and current computer modeling efforts in the agronomic, narcotics and petroleum resources areas will be evaluated to help determine potential modeling and system needs in such topical areas as current foreign agriculture estimation, food and population assessment, water resources assessment, demographic change and migration, and transportation network assessment. Based on these needs, a unique special-purpose minicomputer-based system that will meet the dedicated use and special interactive graphics requirements of OGSR will be designed. Such a system would necessarily involve a direct supplement to the existing MAGAS system, which provides the special graphics analysis capabilities these analytical efforts in part require.

The second phase of the project would concentrate on systems and software procurement/enhancement; in FY 1983 [redacted] would be used to acquire an array processor and [redacted] to upgrade MAGAS to give the added computational capabilities to make it compatible with the array processor. The third phase would involve training

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and applications development; [redacted] in FY 84 and [redacted] in FY 85 would be devoted to contract programming to adapt relevant models to the system. Approval of the Spatial Data Analysis Project would provide for a logical enhancement and expansion of existing analytical activities and capabilities in OGSR and would result in a consolidation of many OGSR data processing efforts. The Project would have a high probability of success and would involve a relatively small investment of funds. 25X1

c. What is to be Developed:

The Project will implement new and innovative ADP hardware and software techniques with the goal of improving the quality of OGSR's intelligence products in its Geographic Research and Environment and Resource Analysis Programs. Specific areas that will be addressed in developing these capabilities include:

- o Petroleum analysis software and estimative techniques applications
- o Spatial inference modeling in support of geographic, environment and resource issues
- o Further improvement of graphical analysis capabilities and procedures
- o Alternative methods for processing, exploitation and presentation of analytical data

d. Who Will Accomplish

The proposed OGSR Spatial Data Analysis Project would be operated by existing OGSR staff with external hardware procurement, contractor development and software implementation and external consultant assistance.

IV. INTELLIGENCE COMMUNITY APPLICABILITY:

While the Project will initially concentrate on techniques of the most utility to OGSR's intelligence production program, the resulting research and analyses findings will be made available to the entire Intelligence Community, and it is logical to expect that the added modeling capability it will provide will support analytical efforts in other sectors of the Community as well as in OGSR and CIA should the need arise.

V. INTELLIGENCE CONSUMER BENEFITS:

The principal benefit to consumers is that policymakers will be able to have many of their queries on natural-resource-related issues currently handled by OGSR answered far more quickly and definitively than is now possible. The effects of alternative policies could be examined rapidly with a high degree of confidence because all of the available data can be taken into account in each case. The

costs of these analytical efforts would be minimized through the use of a dedicated modeling system of this type because contractor/consultant efficiencies would be greatly improved by the rapid turnaround and extended computing capacities that would be acquired. Operational efficiency of all CIA computer-using analytical efforts would be improved because the Project would divert a significant number of large, time-consuming analytical programs from Agency mainframes to a system that both would handle them much more rapidly and provide the unique interactive graphics that make such large-scale programs so useful for analysis.

VI. PROBABILITY OF SUCCESS:

The probability of success for the Spatial Data Analysis Project is high, as much of the software that OGSR is interested in using has been acquired or is available in industry, and most of the rest is well along in the development phase. The necessary ADP hardware that would support OGSR objectives is also in existence in industry or in the final stages of development. The chances of blending both the new hardware and programs with the existing MAGAS system appears excellent, since the requisite array processing technology has already been melded with similar PDP equipment successfully. The implementation of the new analytical procedures and techniques that would follow will greatly enhance current analytical efforts and will break new ground in the area of improved quality, timeliness and completeness of intelligence research and analysis products in OGSR.

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I. PROJECT TITLE: Industrial Analysis Forum

Submitting Agency: CIA

II. COSTS:

25X1

III. DESCRIPTION OF PROJECT:

a. Statement of need:

There is a recognized need among high level policymakers for finished intelligence integrating specific industry knowledge, multicountry political economy, and knowledge of the world market that provides world-wide, in-depth perspectives on key industrial issues.

The problem facing NFAC is to insure that industries, sectors within industries, and national industrial policies are properly understood. NFAC has neither the time nor resources to indigenously develop such in-depth expertise over the wide range of topics associated with industry analysis. Our best chance for success is to combine in-house and other government expertise with the considerable knowledge already available within the US business and financial community.

What will be developed:

We propose to bring together representatives from government, industry, and academia to analyze and discuss various industries and industrial policies. The specific topics will be identified as NFAC analysts develop a better appreciation for the issues. Likely topics include worldwide developments in machine tool production capacity and technology and the international differences in the cost and availability of investment capital.

The forum will consist of a roundtable discussion focused on one or more scope or issue papers on the topic in question. These papers would be contracted in advance and reviewed by the participants prior to the actual discussion. The papers and a record of the ensuing discussion would be published by NFAC for government-wide distribution.

IV. COMMUNITY BENEFITS:

The papers and the ensuing discussion will benefit working level analysts within the government organizations following US and foreign industrial developments. They will be used to sharpen NFAC understanding of the issues and dynamic forces shaping industrial developments internationally. As such they would serve as a starting point for further analysis, including external contracts on specific research topics identified by the forum and a tasking of the Agency's unique

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collection capabilities. The end result would be published intelligence memoranda. Lastly, such roundtables will provide an opportunity for intelligence collectors to quickly come up to speed on the issues in questions and thus better fulfill their reporting responsibilities.

V. CONSUMER BENEFITS:

This proposal will make available important, substantial resources to the Intelligence Community, improving our capability of providing good, timely policy support on an important subject: the parameters and dynamics of threats to the US and allied industrial base, and the role of foreign governments in technological and industrial development.

VI. PROBABILITY OF SUCCESS:

Success will, to an important degree, depend on the willingness of US Industry to participate, particularly willingness to share proprietary data affecting international competitiveness of specific industries. Preliminary discussions by OER with industry leaders, however, lead us to believe that they would view such participation as being in their own long-term interest. We would expect that this new and more coherent approach will turn up information not presently available to the Intelligence Community, especially in Free World countries, and lead to sharply defined external analysis contracts with funds earmarked for the out-years of the program.

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Approved For Release 2008/07/25 : CIA-RDP85M00816R001100160002-2

I. PROJECT TITLE: SYSTEMS MODELING CENTER

Submitting Agency: CIA

II. COSTS:

25X1

III. DESCRIPTION OF PROJECT

A. Statement of need:

The increasing need for multi-disciplinary teams in the analysis of complex intelligence questions poses the problem of how different types of expertise and information can best be combined. Existing mechanisms for combining the expertise of several disciplines into intelligence products are deficient; genuine synthesis rarely takes place. Clearly, alternative mechanisms need to be developed. In this regard, formal modeling of complex intelligence problems has distinct advantages in a multi-disciplinary environment. Working as a team, analysts bring together their particular contributions, but are required to come to a common understanding of the factors that shape the situation. Modeling allows the analysts to explore the interactions between political, social, economic, and military factors in ways that are simply not possible through conventional analytic approaches. Differences in viewpoint between team members can be explored through the development of alternative models. The outcomes of alternative models can then be compared and evaluated--leading analysts to a better understanding of the impact of their differing views. Whether or not the results of the formal model are explicitly incorporated into the final intelligence product, the modeling effort will provide the analysts with a better understanding of the key assumptions of their analysis. In turn, this understanding will enable analysts to search more efficiently for needed information in the future.

B. Status and Requirements:

NFAC analysts are generally unaware of formal modeling techniques of potential applicability to intelligence problems, such as system dynamics, linear programming, difference equations, artificial intelligence, and applications of graph theory. What is required is the establishment of an NFAC resource unit that could provide assistance to analysts, particularly those involved in multi-disciplinary work. Regional units that cut across office lines would be especially in need of assistance. External research funds will be used to hire outside consultants and contractors to provide the necessary expertise.

C. Implementation and timing:

During FY82, NFAC will survey the modeling abilities of its analysts, arrange with OTE to strengthen those abilities through training, and evaluate the approaches identified by ORD in its Intelligence Production Laboratory project. We anticipate that the need for outside assistance will decline from FY83 to FY85 as in-house capabilities are developed.

IV. INTELLIGENCE COMMUNITY APPLICABILITY:

The systems modeling center will be an NFAC-wide resource whose primary clients would be interdisciplinary teams or regional units. It would also serve individual analysts working on complex intelligence problems that lend themselves to a more formal approach. As expertise grows within NFAC, greater interaction with DOD modeling units can be anticipated--particularly when the problems being addressed contain a large military component.

V. INTELLIGENCE CONSUMER BENEFITS:

The development of modeling skills in NFAC will improve the quality of interdisciplinary analysis and lead to more forward-looking estimative work. By being based on models where the assumptions are explicit, policymakers will be better able to identify the critical factors shaping intelligence estimates. Models also offer policymakers the opportunity to simulate the impact of alternative policy choices.

VI. PROBABILITY OF SUCCESS:

There are no known technical or administrative obstacles to the enhancement of formal modeling skills in NFAC. We do anticipate some time lag before a majority of NFAC analysts will feel comfortable with these new techniques.

I. PROJECT TITLE: Multidisciplinary Military Research

Submitting Agency: CIA

II. COSTS: [redacted] 25X1

III. DESCRIPTION OF PROJECT:

a. Statement of Need:

[redacted] 25X1

Existing Military Operational Research (MOR) procedures have been developed over the years to accommodate modest (by industrial standards) data bases. Expanding collection technologies which are providing near real-time data bases have created a data base management crisis. The classical MOR approach has failed to provide the required DATA BASE MANAGEMENT, INFORMATION HANDLING SYSTEMS, and LARGE SCALE MODELS to accommodate the glut of electronic data which daily flood intelligence channels. Vast quantities of costly data are being stored on the premise that it will eventually be exploited. Unfortunately, much of this data's value is lost unless there is timely analysis. (C)

It is apparent that the 80's will also provide numerous opportunities for new data collection systems. The recent advances in modelling technologies, hardware systems, and data management tools will provide the analysts with tools to handle the myriad of data, generate models, and simulate scenarios in real-time. These new analytical methodologies will enable the community to more accurately define collection requirements and thus better serve the needs of the military analysts. (S)

b. What will be Developed

The program will consist of five research elements:

- o RED Force and Special US Operations Research Software and Firmware (RMOR)
- o RED Force Data Base Management System (DBS)
- o General System Emulator software and firmware (GEMUL)
- o Specialized Hardware System to support all phases (HW)
- o Operations and Logistics Emulator (BEMUL) (S)

c. Who will Accomplish:

This project will be a joint undertaking among ORD (AMR), NFAC (OSWR, OSR, OGSR & OIA), OSO, NPIC, ODP, NSA, and DOD The project will involve ORD's proven multidisciplinary, inter-agency management and research approach. (C)

Indirect Agency and DOD manpower cost is 15 man-years per year (5 Agency, 10 DOD). Personnel loading is projected to decrease during the third year to ten man-years (three Agency, seven DOD). (C)

25X1

TOP SECRET

Communications among the team members will be accomplished by the Distributed Management Approach. This project will require an additional staff member beyond the existing ORD manning complement. (S)

d. Time Phasing:

The program would be completed in three years with a major operational pay-off each year. Direct research costs are projected at [redacted] FY-85 costs will be borne directly by participating agencies. 25X1

SCHEDULE OF DELIVERABLES

	FY84	FY85
RMOR	Preliminary Operational Capability	Operational
DBS	Operational	Advanced capability
EMUL	Preliminary Operational Capability	Operational
HW	Operational	Operational
BEMUL	Preliminary Operational	Operational (C)

IV. INTELLIGENCE COMMUNITY APPLICABILITY:

This program will provide the Community with a unique set of evaluation tools which do not exist in the intelligence Community. However, this general technology is being exploited by industry, and this approach offers a solid foundation. (C)

V. INTELLIGENCE CONSUMER BENEFITS:

The consumer will now have the dual benefit of previewing projected SOVIET/EAST bloc military moves and measure of NATO force effectiveness. Additionally, national intelligence collection systems could be programmed for optimal targeting. (S)

VI. PROBABILITY OF SUCCESS:

Though this program has a number of high risk elements, the approach to MILITARY OPERATIONAL ASSESSMENT is based on proven industrial process model techniques. ORD's proven distributed management approach will provide a highly reliable product. (C)

SECRET

I. PROJECT TITLE: Advanced Computer Techniques for the Production and Interpretation of Finished Intelligence Products

Submitting Agency: CIA

II. FUNDS: [redacted] 25X1

III. DESCRIPTION OF PROJECT:

a. Statement of need:

The final step in the intelligence cycle is the preparation and dissemination of a finished intelligence report. Today this process is aided by computer data bases of text material, word processing equipment, and electrical communication of data to computer-aided printing systems. But there is a problem which arises in the production and interpretation of finished intelligence products: how to find information on the subject of interest and how to identify related reports or parts of reports.

Preparation of a report involves organizing material into a preestablished framework. For example, sections of previously published reports may be used as a starting point for a draft report. A report will then proceed through various coordination and editorial reviews to establish that the report is correct, internally consistent, and coordinated with other material bearing on the same subject.

The readers of these reports want to know the relationship of raw intelligence information to the views expressed, the consistency and logical development of the arguments within a report, and the relationship of the expressed views with those contained within other reports.

Both aspects of report preparation and interpretation may be seen in the preparation of National Intelligence Estimates. Normal to this process is the coordination and resolution of differing views of an intelligence issue. There is no ready mechanism that allows those responsible for the preparation of an NIE to ask questions on the resulting consistency of the NIE when a given item within the estimate is changed, or to question estimate's inherent support of a given perspective.

SECRET

Approved For Release 2008/07/25 : CIA-RDP85M00816R001100160002-2

Increasingly, text is being stored within computer systems as part of the report preparation process. We propose to take advantage of this to make report preparation and interpretation easier.

Classically material has been retrieved from computers by three methods--a user provides title, author, date, etc. (bibliographic retrieval); a user provides words describing areas of interest and the computer matches them against index terms (index retrieval) or against the text of the documents (keyword search). While these approaches are useful, they also have limitations. Bibliographic data may be too general to be of use. Index retrieval and keyword search may require the user to guess at the terms an indexer or author used to describe the area of interest. Confusion may arise in the use of terms. These retrieval methods have led to frustration as users cannot find material they know is present in a data base or they find too much material, most of which is not relevant to their interests but does meet the requirements of the search.

We propose a new form of storing and retrieving finished intelligence which will augment these classical approaches. The idea is to store intelligence reports as collections of paragraphs or sections, each of which is indexed, not only by its subject matter, but also by its semantic attributes, e.g., its function in the intelligence report or its relationship to parts of other intelligence reports. Examples of such attributes include "updated estimates," "evidence supporting conclusion," and "more detailed description." It will then be possible to retrieve, assemble, and contrast text segments by these semantic attributes.

The addition of indexing by semantic attributes allows the users of the data base of intelligence reports to find the report parts in which they are interested more rapidly--to check to see what was said before, what needs updating, etc. Perhaps more importantly, however, because the relationships among parts of reports are stored the user/analyst can identify the related sections which may be impacted by changes. Those working on NIE's can find supporting material from their Agency's related publications when coordinating and resolving conflicting views as well as identifying where the associated changes should be made.

The addition of explicitly storing semantic attributes will result in easier preparation of subsequent reports and better interpretation of report meaning. Also the discipline of making explicit the logical structure and relationships in reports will result in better organized reports.

b. Who will accomplish:

The proposed work would be done by existing ORD staff personnel with external contract assistance. Initial indexing will probably be performed by contractors with analytical offices giving final approval to the results. Only after the methodologies have been tested with contractor personnel will analysts be asked to index. However access to the system for retrieval will be made available to analysts at the earliest feasible moment.

c. What is to be developed:

We will develop a testbed system which will include the development of the following:

- Indexing schema needed to support a finished intellignece data base.
- A set of indexed finished intelligence reports.
- Techniques for storing indexed finished intelligence.
- Methodology for allowing analysts to index, with minimal effort, finished intelligence as it is being written and coordinated.
- Methodologies for using the indices to retrieve intelligence of interest, including mixed retrieval strategies (i.e., using both the new and classical retrieval methods).
- Techniques for including the new system within the analysts normal working environment (e.g., word processing equipment, SAFE).

We will then evaluate the use of this way of storing and retrieving finished intelligence over traditional methods.

d. Time phasing:

In the first year of the project, we will identify the formal indexing and structuring requirements needed to support a data base of finished intelligence. During the second year we will build a testbed system. The third year, beyond the scope of the DCI Enhancement, will be devoted to careful evaluation of the system for operational use. We expect that during the third year the testbed system will also serve as a semi-operational resource for the subset of Agency products it contains.

The product of the first year will be a report defining the relationships among parts of Agency products and the indexing methodology which will make their retrieval and use more efficient. Some analysts may find this product useful in and of itself since it can be used as a guideline/checkline for organizing reports. At the end of the second year, the testbed system will be available as a resource. The results of the third year will be reports documenting the advantages and disadvantages of the system, recommendations for its future, and the experiences and comments of its users. FY85 costs will be borne by ORD.

IV. INTELLIGENCE COMMUNITY APPLICABILITY:

The project will produce an enhanced ability for the CIA to coordinate reports with the rest of the Community and to respond to requirements from the Community for special reports. It is also likely that the CIA's experiences from this project will be applicable to the reporting procedures of the other agencies.

V. INTELLIGENCE CONSUMER BENEFITS:

The project will result in a system which will make it easier for analysts to produce more timely and comprehensible reports. The production of customized reports will be easier. In general, reporting should appear more responsive to the consumer.

VI. PROBABILITY OF SUCCESS:

The probability is high for producing a system which will significantly improve information retrieval including retrieval of related reports. That this capability will improve timeliness of report production and coordination seems very likely. Whether or not the system will improve report organization may depend on the individual reports--

many are well organized now and it remains to be seen if the system will be of great benefit in this area. It is likely that the effort required to enter the semantic indices will not be burdensome. But the third year evaluation is required to establish the operational cost/benefits relationship.

PROJECT TITLE: Analytical Skills Enhancement Program

Submitting Agency: CIA

COST: 25X1

External Contracts [redacted]

Internal Man-Years 3 6

DESCRIPTION OF PROJECT:

Statement of Need

Most projects to improve the quality of intelligence analysis thus far have been narrow in scope. Few projects have addressed, in concert, several generic issues such as providing a cost-effective training curriculum, identifying analysts who could most benefit from specific types of analytical training, or providing work environments supportive to conducting superior analysis.

This proposal differs because it takes cognizance of the simultaneous and interrelated impact of the bureaucratic, managerial, and analytical components on finished intelligence production. It distinguishes substantive knowledge from generic analytic (problem-solving) and methodological skills; and focuses on the generic issue of how to improve analyst problem-solving performance by identifying specific skills useful to analysts, by designing an appropriate analyst-training curriculum, and by developing a tightly coupled management/training system sensitive to

promoting the cost-effective acquisition and use of generic problem-solving skills.

Quality analysis usually incorporates the application of systematic methods, which can result in explicit and consistent logic that can be examined independently and conveyed clearly to consumers. But most attempts to introduce effective methods into the analytic environment have failed to address adequately the issue of how to to select "THE" technique most appropriate for the problem at hand.

The literature dealing with generic problem-solving skills distinguishes between the ability to implement a specific analytic technique (how to manipulate data via a specified algorithm), and the ability to pair available techniques with general classes of problem-types. Analytical training in the Intelligence Community has, thus far, heavily emphasized the former of these two distinct skills. Hence, the current analyst community has had little corporate training in, and is relatively unaware of, the conceptual aids that can be derived from the application of systematic problem-solving strategies (as distinct from algorithmic "tactics"). Seldom do specialists, which most analysts are, receive training in generic problem solving-strategies or techniques beyond perhaps the scientific method. Additionally, current managers of analytical units (who are predominantly former analysts) have the same lack of problem-solving exposure and expertise.

Since methods to a large extent determine (more precisely predetermine) the kind of conclusions that will be reached, the how and why of selecting appropriate techniques should be understood by all analysts. There is no

methodological panacea. Every technique has weak points. What is needed is a training curriculum that teaches not only the fundamentals of implementing specific techniques, but also strategies for selecting techniques according to their logic, assumptions, and purpose(s).

Some techniques are quite formal (structured), whereas others seem so informal as to hardly be "techniques" at all. They also can vary along dimensions such as Veridicality (subjective versus veridical) and Complexity (simple versus complex). Each of the dimensions has advantages and disadvantages associated with its extremes. Table 1 gives some thoughts on this. (The UPPERCASE factors suggest advantages, the lowercase factors, disadvantages.)

The problem-solving skills of the analyst community can be improved by providing awareness of and training in both the fundamentals of using specific techniques (which we already do fairly well) and the process through which one can better select techniques appropriate to a given problem. To accomplish this goal, managers of analytical units must become familiar with general problem-solving strategies in order to identify persons requiring training in specific problem-solving skills and to support the appropriate use of these techniques on-the-job. Currently, there is no management system, nor any management training program, designed to accomplish this purpose. This proposal addresses these needs.

Table 1 - COMPARISON OF DIFFERING TECHNIQUE TYPES

COMPLEXITY	
Simple	Complex
FAST	slow
EASY	hard
CHEAP	expensive
	confusing
non-enlightening	INSIGHT HELPFUL
narrow focus	COMPREHENSIVE
limited capacity	LARGE CAPACITY

STRUCTURE	
Unstructured	Structured
FLEXIBLE	rigid (inhibits creativity)
potentially inconsistent	CONSISTENT
undocumented	DOCUMENTED
updating sophisticated	EASILY UPDATED

VERIDICALITY	
Subjective	Veridical
LOW DATA REQUIREMENTS	requires hard data
soft results	CORRECT RESULTS

What Will be Developed

This proposal will result in several products:

1. Key problem-solving skills judged to be useful to intelligence analysts will be identified.
2. An initial inventory of the current level at which these skills are present in NFAC will be generated.

3. A management procedure for periodically assessing the problem-solving performance and skills needs of each analyst will be devised.
4. A supplemental management curriculum designed specifically for first-line supervisors of analytical components will be developed.
5. An analyst-training curriculum, matched to the needs of NFAC and coordinated with the management skills assessment system mentioned in 3 above, will be designed and implemented in the Office of Training and Education.
6. An evaluation program to assess the success of this project and its impact on production quality will be designed.

The list of key problem-solving skills useful to analysts will be developed for the kinds of problems facing the various NFAC analytical components. The list will be based on theoretical/empirical results of problem-solving research in fields such as systems analysis, information science, and creative problem solving, and will provide the foundation around which the remainder of the project will be structured. Thus, the list must be thorough, and key players controlling later implementation phases of this project (senior NFAC and OTE managers) must reach concensus agreement about the list's veridicality and usefulness.

The management system devised for assessing analyst problem-solving capabilities and needs will be based on research to identify behavioral or performance observables that permit the extant level of problem-solving skills to be assessed. The same research results will be used to design a survey to poll NFAC supervisors. This survey will provide initial

information about current NFAC problem-solving resources and the distribution of these resources within NFAC, thereby facilitating the selection of those problem-solving courses to be implemented first and the initial class memberships. The skills assessment vehicle will provide NFAC management with new and useful tools for assessing analytic capabilities (both current and potential), as well as blindspots, so that the directly related analytical training curriculum can be utilized most effectively.

The NFAC Supervisors Curriculum[1] will be based on the results of research conducted or reviewed as part of this proposal; and would include such things as categories of problem-solving techniques and the problem-types to which these technique classes are appropriate, how to assess problem-solving skills, understanding differing personality types and the typical analytical styles and preferences of each type, providing an office environment conducive to productive analysis, cost-effective allocation of analytic resources, minimizing bureaucratic interference(s) with effective analysis, etc. (The curriculum will not include material that duplicates or competes with standard management training courses.)

The analyst training curriculum will not represent an entirely new body of instructional material. Rather, it will reorganize current course materials into a problem-solving format and incorporate new problem-solving material identified by this project. The curriculum will be tailored to meet both the training needs of NFAC analysts and the resource allocation constraints of NFAC management. Each course will have a very specific skills objective, against which supervisors can match specific skills needs

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[1] The supervisors curriculum will be less extensive than the analyst curriculum, and conceivably could consist of one course only.

of individual analysts.

The project evaluation portion of this proposal will provide senior management with a vehicle for assessing the value of having implemented an initial portion of the training program. This will facilitate decision making about subsequent resources to be devoted to analytic training of this nature, and concurrently would provide feedback to OTE on the quality and relevance of various training activities, methods, topics, and the effectiveness of different instructors or courses.

Who Will Accomplish

The program relies on external research and substantive support, with active internal collaboration and participation. It seeks the active involvement of senior NFAC and OTE management, so that the project will have a reasonable chance of successful implementation. A staff study that asks senior management to implement a system to evaluate analyst problem-solving skills or to utilize (or develop) a new training curriculum will have little chance for success unless the responsible decision takers have accepted the basic assumptions of the project--in this case, the list of useful problem-solving skills--and have approved in principle the goals of the project.

External contract work would be monitored from ORD/ACS or ORD/AMRD, with OTE and NFAC providing technical critiques. The main players would be the internal and external substantive "experts" needed to identify and design the recommended curriculum content and structure, to design the survey and analyst evaluation vehicles, and to develop the actual course

material. Other key players, included because of their roles in implementation, would be the D/NFAC and AD/NFAC (in advisory capacities), the NFAC career development officers (in active decision making and evaluative roles), the NFAC Senior Review Panel (to coordinate the project evaluation effort), and senior OTE management (to coordinate curriculum design and development).

Time Phasing

The project proposed consists of numerous distinct, but interrelated and interdependent, activities. They are summarized into 9 general tasks in Table 2, the time phasing for which is summarized graphically in Figure 1. External support of these activities can be divided into several separate contractual efforts.[2] This will permit multiple contractors to be used if this approach would optimize expertise availability. The tasks are discussed separately below.

Task A. The overall success of this project will depend heavily on the extent to which desirable problem-solving skills can be identified accurately and converted into a useful training curriculum. External experts contracted to perform this task will undoubtedly be able to complete work more quickly than in-house personnel with relevant substantive expertise, but who would need more time than would external

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[2] The contractor selection process will use a decision analytic, hierarchical utility model to evaluate the proposals. The structure of this model will be included with the Request for Proposals to communicate as clearly as possible to the potential contractors the factors considered to be important.

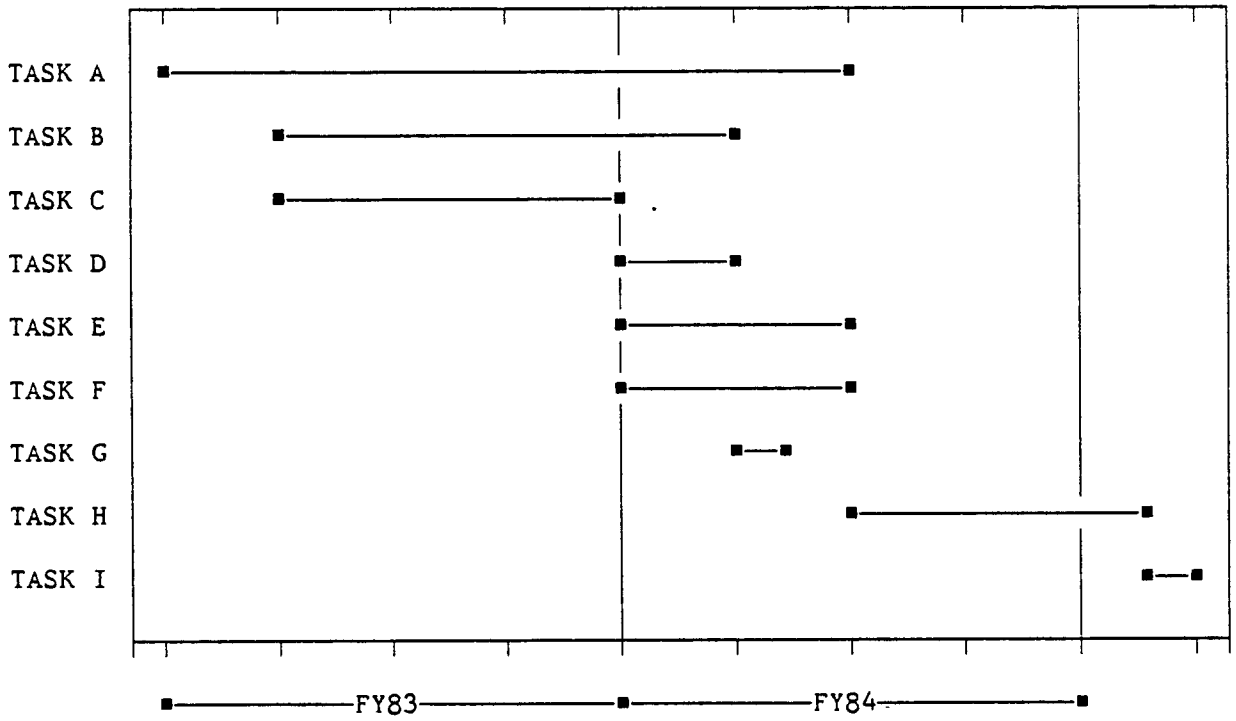
TABLE 2

Task	Months	Cost	Description
A	18		Determine Desirable Problem-Solving Skills and Develop Analyst Training Courses
B	12		Determine Methods for Assessing Problem-Solving Skills of Individuals, Survey Current NFAC Skills, and Develop Assessment Vehicle for Management Use
C	9		Identify Environmental Factors that Affect Problem-Solving Effectiveness and Identify Management Techniques to Optimize Them
D	3		Conduct and Evaluate Survey of Extant NFAC Problem-Solving Skills
E	6		Determine How to Assess the Effectiveness of the Training Program
F	6		Design and Prepare the NFAC Supervisors Curriculum
G	1		Select the Specific Courses to be Implemented First
H	8		Conduct and Evaluate the Initial Courses
I	1		Decide on Future Commitments to the Problem-Solving Training Program

25X1

experts to become thoroughly familiar with relevant problem-solving literature and who probably would be unable to work full-time on this task. To minimize completion time and to maximize available expertise, it is suggested that external resources be used to support the majority of this task, with internal personnel interacting frequently to enhance their own knowledge through the close association with the external substantive experts from the private or academic sectors.

Figure 1



The figure summarizes the approximate time phasing estimated for the tasks listed in Table 2.

The list of good problem-solving skills must identify, define clearly, and defend the relevance of the selected skills to problem-solving activities as they exist in the information-incomplete and time-constrained world of the intelligence analyst. Inherent in this task will be the identification of generic types of intelligence analysts, (i.e., those job-

categories requiring the application of similar problem-solving techniques), and the specification of the degree to which each of the skills included apply to each of these analytical job-types.

Once the set of desirable analyst problem-solving skills has been developed, a conceptual design for an appropriate Analyst Training Curriculum can be undertaken. The content of the courses included will already have been identified fairly clearly by the skills list. Thus, the design activity will be devoted primarily to deciding the most cost-effective way to "package" the training alternatives.[3]

Developing the classroom materials needed to support the analyst training curriculum is estimated to be the most time- and resource-consuming task of the entire project. External contractors could be used to present lectures as well as to develop material, but it is recommended that external contributions be limited to the substantive identification and development of specific, useful classroom material.

Several in-house experts (primarily from NFAC) should be assigned to supplement OTE instructor personnel on a part-time (e.g., guest lecturer) basis. This will serve the multiple purpose of involving NFAC more closely in the curriculum development and content, of identifying (or creating) experts in various topics among the analyst community, and increasing the linkage (coordination and communication) between OTE and NFAC personnel

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[3] For purposes of this proposal it has been assumed that the training curriculum will consist of a set of interrelated courses; but actual project work will not limit results to traditional means of instruction only.

[4] Work that should support curriculum development actually has been started already, in the form a Problem-Solving Handbook (currently about 225 pages) being developed jointly by OTE and ORD (copies of the current

regarding the analyst training curriculum.[4]

Task B. The portion of this task devoted to identifying observables by which an individual's extant problem-solving performance can be judged will involve basic research conducted by external contract. From the results, instruments can be developed both for assessing current training needs of the analyst community and for developing evaluation devices for management. The time-frame of the proposed project will not permit the research on this topic to reach final, definitive conclusions; but reasonably sound results should be achieved. These results can make a meaningful contribution to managements's capability to accurately assess problem-solving abilities and needs.

Designing the survey "form" will have a large degree of overlap with designing an assessment vehicle for NFAC supervisors to use on-the-job for periodically assessing the problem-solving skills of each employee supervised. But, the survey form will be designed for use by supervisors who have had no training in identifying or evaluating the use of problem-solving skills in their employees. Also, the survey form may keep track of results by component, but will not identify individuals. The survey form is meant to provide preliminary, working data.

The supervisory assessment vehicle will permit this program to function efficiently over the long term by providing a mechanism for identifying analysts who are weak in problem-solving skills needed (or desired) for optimum performance in their current job. Since assessing job-related skills of individuals has potential implications for complimentary use for

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version are available from [redacted] STAT

such things as in promotion considerations, the development of the supervisory assessment vehicle must be conducted throughly. In contrast to the survey form, this vehicle is intended to provide accurate data. Oversight and/or participation of senior NFAC management (ideally, the career service officers) on this project would be desirable.

Task C. This task involves external research to identify environmental factors that can be manipulated by managers to increase analytical performance. Part of this task will be the empirical identification of environments that work well. A second part will be the theoretical specification of environments that should encourage analysts to use, and optimize their ability to use, the skills identified in Task A. The intent is not to review or replicate the literature on group problem-solving techniques; nor is it confined to helping groups work more effectively together. Rather, the object is to identify working environments that help and encourage individual analysts, as well as groups, to use appropriate problem-solving skills.

Research to identify management techniques that can help to optimize environmental factors for enhanced problem solving, is a direct follow-on to the initial portion of this task. It is intended to take the "wish-list" of desired environments and to determine a) techniques that a manager can use to generate a desired environment, and b) factors that a manager can use to assess the current status of the working environment being supervised.

Task D. This task, to be conducted entirely in-house, involves conducting the initial survey of problem-solving skills extant in NFAC, and analyzing the responses to the survey. The results of these activities will facilitate the selection of courses to be offered initially and the anticipated frequency with which each of the courses will be offered. The survey results also will provide useful classroom material for the NFAC supervisors curriculum.

Task E. Before the training curriculum is finalized, decisions need to be reached on how the impact of the program will be assessed. These decisions probably will influence the selection of the analytical and supervisory training alternatives to be offered first, since it may be wiser to start with a lower-priority (in terms of the determined problem-solving needs of analysts) course, the impact of which can be assessed meaningfully, than with a high-priority course, the impact of which would be difficult to assess accurately or quickly.[5] It is recommended that external support be provided for developing evaluation alternatives from which in-house management can select the most desirable.

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[5] A potentially useful evaluation alternative is the Analyst Workshop Project (scheduled to begin in FY82) under ORD sponsorship. It could be used to evaluate the analytical appropriateness of the responses of trained versus untrained groups of analysts to similar (or even identical) intelligence problems within the context of the Workshop's laboratory-like conditions.

Task F. Design of the NFAC Supervisors curriculum can begin after completion of earlier tasks about the precise observational skills/tools that managers can use to help assess employee problem-solving skill accurately, about the overall status of problem-solving skills extant in NFAC, and about the things that supervisors can do to optimize the chances that their employees will employ good problem-solving techniques. Once the curriculum design has been accomplished, work can proceed on providing classroom materials. Much of this will have been clearly identified and/or provided by earlier task activities, but the most likely in-house candidates for coordinating this task (OTE management school personnel) probably would be able to work on developing materials on a part-time schedule only. Therefore, external support is allocated for this task.

Task G. Based on the training needs identified by the survey data, the results of the research to develop means of assessing the programs effectiveness, the availability of analysts and supervisors from NFAC, and the availability of OTE personnel, the initial training courses to be offered will be selected and scheduled. This task is to be accomplished entirely in-house, involving the joint participation (under OTE leadership) of NFAC management, the OTE schools involved, and the major in-house participants from the other related project tasks.

Task H. The survey results can be used in this task to identify NFAC components having skills needs that match the set of courses chosen for initial implementation. Including the supervisors of these components in the initial supervisors course(s), and polling them to identify relevant,

available analysts, should permit the initial class rosters to be determined.

The time estimated to run the initial set of courses could vary tremendously depending on such things as the number and length of courses chosen, the availability of classrooms and instructors, and the priority given by NFAC to implementing this program. Three months to five months are estimated.

Evaluating the impact of the training courses offered initially can begin as soon as the first course ends, if a short-term assessment method is selected. But if the chosen assessment vehicle requires long-term performance observations by supervisors, the 8 months estimated for the entirety of Task H will be too short.

Task I. The inclusion of a task to decide on future commitments to the problem-solving approach to analyst training is included to insure that the program can continue beyond the initial implementation phase only on the basis of merit. Additionally, it emphasizes the implicit intention that this program not become static and unresponsive to changing training needs. The decision at this point should be made by the customers of the training program (NFAC and users of finished intelligence products) based on the impact or expected impact that the training program is assessed to be capable of having on the quality and usefulness of analytical products.

INTELLIGENCE COMMUNITY APPLICABILITY

Benefits accruing from the proposed project will be directly relevant and transferable to all training facilities in the Intelligence Community. Furthermore, the project research may identify observable characteristics or non-substantive academic skills that are desirable to acquire in new employees, thus aiding recruitment programs.

The establishment of a common, coordinated analyst-training curriculum also can help to establish a common "analytical language," thereby facilitating inter-analyst communication, and perhaps resulting in a more consistent format, style, or "language" for communicating finished intelligence to consumers.

The supervisors curriculum should help promote effective utilization of analytical resources by enhancing a supervisor's ability to match an analyst's skills to an appropriate intelligence task, or to assign joint projects to complementary/supplementary analytical types, rather than to antagonistic or non-synergistic ones.

INTELLIGENCE CUSTOMER BENEFITS

Customers will derive benefits primarily from the increased quality of analysis anticipated from the use of appropriate methods to accomplish systematic analysis. For instance, the use of systematic methods should result in the creation of analytic audit trails that document clearly for both analyst and consumer, the assumptions on which an analyst based conclusions, etc. They also should help analysts a) to specify clearly the levels of uncertainty associated with their judgments, and b) to become

more likely to question their conclusions and to extend analyses to the stage of addressing the "but if I'm wrong" possibilities that frequently are absent currently from intelligence products. The supervisory curriculum should encourage analytical managers to expect that these things be included in the finished products they review.

The use of appropriate methods during all phases of problem-solving activities also tends to focus analytical effort on those activities most relevant to consumer needs (by improving problem selection and problem definition activities). Because the problem-solving activities become more tightly focused and better organized, communication of results and conclusions often becomes more concise and explicit. The tighter focus also can produce greater analytic efficiency, thereby increasing the productivity of individual analysts.

PROBABILITY OF SUCCESS

Several success probabilities can be assigned to this project. The one assessed to be the most critical to successfully implementing this project is the level of acceptance and support that NFAC will give to this effort. This is estimated as a toss-up: 50%.

The chances of successfully developing an appropriate skills list, of devising an appropriate OTE curriculum, and developing supporting classroom materials are all at, or essentially at, 100%.

Assessing the probability that the program will have a meaningful impact on analyst problem-solving behavior probably is best assessed as the percent of students who will incorporate the training to the extent that an

observable behavioral modification or quality of effort can be detected. This probably will occur from 50 to 90% of the time, with a best guess of about 75%.

If the above are treated as joint probabilities (a slightly pessimistic approximation), their product gives the best estimate for the program as a whole:

0.5 * 1.0 * 1.0 * 1.0 * 0.75 = 0.375 -- (about 40%)

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